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The Early Diagnosis

OF

PULMONARY TUBERCULOSIS

CIRCULAR ISSUED BY
THE ILLINOIS STATE BOARD OF HEALTH,
1905.

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"What we ask for is that the consumptive shall be taken care of at the right time in the right place until he is well, and not at the wrong time and in the wrong place until he is dead."—*Dr. John H. Pryor.*

“The prolongation of life by the suppression of preventable disease is of much greater value to the State than the cost of the means employed.”

* * *

“To ward off the calamity of disease and to prevent the spread of a pestilence is to increase the sum of human happiness and to elevate the race.”

* * *

“The cause of the apathy of the people is not ignorance, it is want of knowledge on this one subject.”

* * *

“In medicine, as in higher ethics, he only is great who serves.”

* * *

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THE EARLY DIAGNOSIS

OF

PULMONARY TUBERCULOSIS.

Illinois, with her industrial and agricultural superiority, her commanding position in medical education, her superb history, her long list of eminent students, scientists and physicians, should be most conspicuous in the field of preventive medicine. Her very strength and educational advancement should impose upon her physicians and health officers the obligation to utilize the best means obtainable for the protection of her millions of people from disease.

The ravages of pulmonary tuberculosis within the State, present a condition which can be coped with only by the co-operation of the medical profession in instituting the most approved methods of prevention.

The registration of vital statistics and especially of mortality statistics, is essential to a progressive and intelligent public health administration. Such a system of registration, obtained through the efforts of the State Board of Health, is now operative in Illinois, and it serves as an index of the prevalence of disease, indicating the necessity for radical action in those diseases showing the highest mortality. By it the efforts of proper preventive and curative measures may be accurately determined.

In the entire realm of preventive medicine there is no factor more potent than early diagnosis, first, because disease is far more readily amenable to treatment in the early stages, and second, because early diagnosis affords great advantage in preventing the spread of infection to others.

At the present time thousands of consumptives are going about the land, unaware of their own condition and taking no precautions to prevent the spread of infection in their homes or workshops, or to those with

whom they work or with those who are near and dear to them. The early determination of the character of the ailment with which these people are afflicted and careful instruction as to their duties to themselves and to others, will do much toward checking the spread of the disease and will be the performance of one of the highest offices of preventive medicine. The public have a right to expect and demand this protection, not only from local and State health officers, but from the physicians in private practice into whose hands they have entrusted the health and the lives of themselves and their families.

It is on account of the belief that a proper exercise of preventive medicine is of incalculable benefit to the people of the State and that through it this greatest pestilence may be limited in its spread to an absolute minimum, and thousands of those already afflicted may be saved, that this circular is prepared by the Illinois State Board of Health for the medical profession and it is earnestly hoped that it may prove of some assistance in the establishment of early diagnosis.

That there are so many consumptives unconsciously engaged in the spread of the disease, is due in part to the failure of the family physician to make an early diagnosis of the disease and fully advise the patient as to true nature of tuberculosis.

If every medical man in Illinois would do his part by keeping himself constantly on the alert for suspected cases and in making an early diagnosis in each, and in seeing to it that proper preventive measures are carried out after a positive diagnosis is made, the improvement in the State would be prompt and striking.

EVERY SUSPECTED CASE SHOULD BE TREATED AS A SUSPECTED CASE AND EXAMINED ACCORDINGLY. MORE CASES OF TUBERCULOSIS ARE OVERLOOKED FOR WANT OF EXAMINATION THAN FOR LACK OF KNOWLEDGE ON THE PART OF THE PHYSICIAN.

After the diagnosis is made, it is the duty of the physician, in the interest of truth, in the interest of the patient and of the family and the public, to frankly state his diagnosis, the fact of its infectious nature, the means through which it is spread, and the means by which its spread may be prevented. It is further the duty of the physician to advise the patient of its curability and what he may reasonably expect by doing for himself all that is possible. Withholding the truth from the consumptive patient, regardless of the motive which prompts such action, is radically wrong. A frank statement of fact is not unkindness nor will the knowledge act prejudicially to his physical welfare. Withholding this information removes from the patient and the public their greatest safeguard, and deception on the part of the physician makes impossible the co-operation of the patient, without which cure is absolutely impossible.

THE FAMILY HISTORY.

The family history should be investigated carefully; not because adults ever become victims of inherited tuberculosis, but for two other reasons:

FIRST, the PECULIAR TYPE OF CHEST AND TISSUE in which resistance is diminished and tuberculosis is likely to develop, is possibly inherited. The degree of immunity is below the average. What is inherited is rather an increased vulnerability to adverse conditions of all kinds;

SECOND, because where there has been tuberculosis in the family, the environment has frequently been unfavorable and the chance of infection has been great. An inquiry as to the existence of tuberculosis in husband or wife or other members of the family or on the part of those with whom the patient may have lived, will often afford valuable evidence of probable source of infection.

PERSONAL HISTORY.

AGE.—No age is exempt, but the disease is not so common in the two extremes of life. It has been observed in earliest infancy and in men over 75 years of age, however.

OCCUPATION is of considerable importance. Workers in brass, flint, polishers, file cutters, potters, millers and others working in atmospheres contaminated with much foreign matter, furnish a large percentage of tuberculosis cases.

The HABITS should not be forgotten. Regular drinkers of liquors are especially susceptible to the disease.

GRIEF, WORRY, CARE, GREAT MENTAL ANXIETY, FREQUENT PARTURITION AND LACTATION, INSUFFICIENT FOOD, UNSANITARY SURROUNDINGS: anything which lowers the general tone and lessens resistance invites tuberculosis.

PREVIOUS ILLNESS should be carefully considered. Pleurisy is often tuberculosis; so also are ischio-rectal abscess and anal fistula. Syphilis predisposes only so far as it lowers general vitality. Influenza, measles, whooping cough and typhoid fever seem to have a marked predisposing influence. Congenital stenosis of the pulmonary orifice predisposes to either pulmonary or general tuberculosis, but this is hardly to be considered in the adult, since such patients seldom reach maturity. Investigation and questioning should be directed toward the existence of enlarged tonsils and adenoid vegetations.

SYMPTOMS.

THE VALUE OR WEIGHT OF ANY SYMPTOM DEPENDS LARGELY ON THE WHOLE CLINICAL PICTURE.

MANY PHYSICIANS ARE LOOKING CONSTANTLY FOR SOME SINGLE PATHOGNOMIC SYMPTOM: A DIAGNOSIS ALREADY SPELLED OUT BY A SINGLE SYMBOL.

IT IS THE MAN WHO CAN SEE AND INTERPRET THE LITTLE SYMPTOMS, THE NICETIES OF LIGHT AND SHADOW IN THE CLINICAL PICTURE, THAT ESTIMATES ARIGHT THE ACTUAL CONDITION OF HIS PATIENT AND MAKES AN EARLY AND CORRECT DIAGNOSIS.

THE SYMPTOMS which should invariably lead to a most careful and complete examination of the patient are: (1) malaise, (2) sense of exhaustion, upon moderate exertion, (3) *loss of appetite*, (4) *impaired digestion*, (5) *slight rise of temperature in the evening*, (7) *night sweats*, (8) *progressive anaemia*, (9) *slight cyanosis of the finger ends*, (10) *hemoptysis* or (11) *pulse rate which is persistently above the normal in frequency*. It is the latter symptom, more than any other, which gives rise to the suspicion of the existence of pulmonary tuberculosis. It is indeed astonishing how many patients, who have been treated for "chronic grip," "chronic malaria," and "dyspepsia," give positive evidences of consumption. The symptoms which occasion such erroneous diagnosis, frequently precede for many months the characteristic cough, night sweats and bacilli in the sputum, and are due to the fact that the absorption of proteids or products of metabolism and disorganization are carried away from the breaking down tubercles by the blood stream, thus reaching various organs of the body and producing vague symptoms which are at first scarcely noticeable. In this way we get the constitutional or general symptoms in a strictly localized disease. The intensity of these constitutional symptoms is an expression of the degree of concentration of these poisons in the blood, depending largely upon the size of the focus and the absorptive capacity of the circulatory channels.

CONSTITUTIONAL SYMPTOMS.

The constitutional symptoms produced by the absorption of these poisons are chiefly the following:

(1) FEVER.—While it is possible that very chronic and mild cases might run their course without noticeable fever, it is very exceptional. In the great majority of cases the elevation of temperature is present and constitutes one of the most important symptoms of the disease. It is

exceedingly variable in character and marked by variations and irregularities, probably influenced by the occurrence of secondary infections or by the personal idiosyncrasies of the patient.

Type of Fever.—Although the Fever follows no distinct type, the following may be frequently noted during the course of the disease: First, there may be an exceedingly insidious form of fever, with only a slight elevation of temperature, perhaps reaching 100° or 100.4° F., usually occurring in the afternoon and absent during the rest of the day. There may be no other symptoms accompanying the fever, or there may be slight malaise, a slight subjective sensation of warmth, slight flushing of the cheeks and increase in the frequency of the pulse out of proportion to the rise of temperature. Slight chilliness may be present, but is unusual.

In the more advanced cases, the temperature may be normal or even sub-normal for a shorter period of the day, but the elevation during the febrile period is more marked than in the earlier stage of the disease. The associated symptoms are usually correspondingly severe. However, the temperature is one of the most reliable of guides. In all doubtful cases it should be carefully taken, at least four times in the day, for several successive days, or until the diagnosis is made. The observation of a temperature persistently above normal, especially in the evening, should give rise to more than a mere suspicion.

The character of the fever of advanced types of the disease does not concern us here.

(2) CIRCULATORY SYMPTOMS.—It is advisable to examine the circulatory system before proceeding to the examination of the respiratory system. The heart may be found congenitally small, the blood vessels correspondingly small and the nutritional possibilities thus limited. In such cases the impulse is feeble, the heart sounds usually sharp and valvular in character, with absence of the muscular element in the first tone. The pulmonic second sound may be accentuated rather early in the disease.

Pulse.—The character of the pulse and the sphygmographic tracing are characteristic and diagnostic. The pulse is small, the pressure low and the frequency increased. This persistent cardiac erethism, more than any other single sign, should cause suspicion of the existence of tuberculosis. It is present in all cases; probably in all cases before the tubercle bacilli are to be found in the sputum.

Let us digress at this point to enter a protest against the use of the term "tachycardia" to designate this persistent increase in pulse rate. The pulse tracings are in accord with the character of the pulse and by some are considered diagnostic.

In regard to the characteristic features of the pulse in early pulmonary tuberculosis, Dr. Edward F. Wells says (*Medical News, Septem-*

ber 21, 1895): "A study of the pulse will afford some of the earliest indications of the existence of pulmonary tuberculosis. From the start, the characteristics of the pulse are changed from the normal. Usually the pulse is accelerated and the rate modified very little by position.

"The latter feature is very suggestive, and whenever the pulse rate is found to be practically the same whether the patient by lying, sitting or standing, the most careful scrutiny is demanded. It is, however, from the spymographic tracings that we obtain the most valuable aid from the pulse in the diagnosis of early pulmonary tuberculosis. From this alone in the great majority of cases, may be confidently predicted the presence or absence of tuberculosis in a doubtful case."

This acceleration of the pulse has been attributed to low blood pressure, which commonly occurs early in the case; vaso motor irritability, as seen in the flushing of the cheeks; diminution in the calibre of the air passages and involvement of the tracheo-bronchial glands. It is probably simply a toxæmia.

The Skin.—In the earlier stages of the disease, the skin may present nothing abnormal. In other cases it may be pale, as it begins to show the existence of anemia and malnutrition. In very young children, it may be covered with a growth of very fine, downy hair. The cheeks may be flushed. The hair may show evidences of poor nutrition very early, becoming dry, losing its gloss, splitting readily or falling out. *The margins of the gums are reddened* in almost all cases, and Sticker considers this one of the earliest symptoms of the disease.

Sweating.—Sweating is an important and, often, a very early symptom of the disease, appearing at times before the physical signs are evident. It may manifest itself only as a slight excess of the normal perspiration, noticeable only on the forehead, hands and feet, or it may be apparent only as a slight clamminess of the skin or may not be observed at all except after slight exertion.

Sweating often occurs at night, usually during the early morning hours, but whatever the character in the earlier stages, the sweats become more and more profuse as the disease progresses.

This excessive perspiration is probably produced by the absorption of the toxins already mentioned, and probably also to the toxins of secondary infection, although many other reasons for its existence have been advanced. *The sweat is not infectious.*

(3) ALIMENTARY SYMPTOMS.—Disturbances of the alimentary tract, especially gastric symptoms, are frequently among the earliest manifestations of pulmonary tuberculosis. These symptoms include loss of appetite, nausea, eructations, bad taste in the mouth in the morning, distention, distress after eating, and in some cases, vomiting. Preceding the respiratory and other symptoms, these frequently distract attention

from the real trouble and lead to error in diagnosis. Some cases, however, present no gastric symptoms whatever until late in the disease.

Intestinal Symptoms.—Diarrhoea may appear before there has been any considerable pulmonary destruction and before either the clinical symptoms or physical signs indicate the existence of the disease.

Emaciation.—Loss of weight is a constant and, often, an early evidence of pulmonary tuberculosis. Its onset may be exceedingly insidious and almost imperceptible, or the emaciation may proceed with remarkable rapidity. In any case in which there is constant and gradual loss of weight, tuberculosis should be suspected and the patient rigidly examined.

(4) **MENTAL SYMPTOMS.**—While the disease may become firmly established without mental manifestations, it is quite common, as it progresses, to note depression, melancholia, irritability or other mental symptoms, changing, in the progress of the disease, to an absolute want of comprehension, or misunderstanding of his condition: pessimism and depression changing to optimism and singular hopefulness, combined with rapid change of mood. Gradually, however, there supervenes loss of will power and self control, weakening of mind and emotionalism.

SUBJECTIVE SYMPTOMS.—*Cough* is one of the earliest of the subjective symptoms of pulmonary tuberculosis. As a rule it begins as a slight hacking, most noticeable in the morning, either unaccompanied by expectoration or with small masses of clear mucus. On the other hand, the cough may be harsher, but dry and unproductive, or, again, dry, harsh, paroxysmal and explosive the amount of expectoration being so small as, at times, to escape detection, and entirely out of proportion to the severity of the cough. Except in the morning, the cough and expectoration may be quite unnoticed until the disease is well advanced. As the amount of expectoration increases, the severity of the cough often lessens. The cough furnishes no clue as to the severity of the disease or of the extent of the lung involvement.

Expectoration.—The amount of sputum varies greatly. In the early stages there may be no increase, in fact, the amount is frequently so insignificant that only by repeated trials can enough be secured for satisfactory examination. A little later there may be a little foamy viscid, glairy mucus containing small, firm granules, not unlike the grains of rice in appearance, while later still, the sputum may contain small, viscid yellow spots or streaks in which the tubercle bacilli may be found, but only in very small numbers. During the period in which the amount of sputum is very small, it will be found more abundant in the morning and at this time specimens may best be taken for examination or for transmission to the laboratory.

Pulmonary Hemorrhage.—Haemoptysis occurs in from 25 to 50 per cent., of all cases and may appear without warning, in the midst of what seems perfect health: the first indication of the invasion of the disease.

In all cases of pulmonary hemorrhage, in which we can exclude aneurism of the aorta, mitral stenosis and disease of the tricuspid valve, it may be reasonably considered of tuberculosis origin. It seems hardly necessary to say that hemorrhage from the gums, throat and stomach must first be excluded.

Several years may elapse between the first pulmonary hemorrhage and the appearance of other definite symptoms of tuberculosis.

OTHER SYMPTOMS.—Pain, dyspnoea, hoarseness and dysphagia and other symptoms common to the fairly well developed types of pulmonary tuberculosis are not considered among the earlier expressions of the disease.

GENERAL EXAMINATION.

After all, the general examination is the court of last appeal. The signs alone are characteristic and diagnostic. Symptoms can only be considered as strongly suggestive.

Before beginning the examination, the patient should, under ordinary circumstances, be stripped to the waist. He should be weighed and a careful inquiry should be made as to whether there has been gain or loss in weight. The latter is suggestive.

The military standard of corpulence (the normal relation of height to weight) is found by dividing the weight in pounds by the height in feet. In France this "vital index," as it is called, is twenty-six, but Loomis (*Medical Record*, December 10, 1898) regards this as too high for the United States and holds that twenty-five is more closely in accord with statistical records, and twenty-three for females, the latter being given on the authority of Bourchard.

INSPECTION.—The *general nutrition* may be good, fair or impaired, depending not only upon the lapse of time since infection, but upon the mode of life and the hygienic surroundings.

The *color* may be normal, or there may be paleness with slight flush of the cheeks or there may be faint signs of cyanosis. There may be undue moisture of the skin or sufficient warmth to indicate a slight elevation of temperature. In other cases the skin may be found thick, muddy and oily, instead of thin, delicate and pink, while bronzing may occur just as in Addison's disease. The bronzing, however, is rare and very seldom an early sign.

In children and young people, there may be a growth of very fine, downy hair. The hands may be normal or there may be a slight cyanosis, especially noticeable under the nails. In more advanced, chronic cases, when the aeration of the blood has been deficient for some time, "clubbing" of the finger ends may be found. Long, slim, tapering fingers, associated with the "alar" chest, are often noticed.

The *pupils* are often dilated. This has been described as one of the earliest signs of the disease.

The *chest* may be of the "alar" or the "pterygoid" type of Galen, with long neck, sloping shoulders and wing-like projection of the scapulæ, or it may be entirely normal in contour.

MENSURATION.—The thoracic perimeter is important. It is obtained by adding the circumference of the chest during forced inspiration to that at forced expiration and dividing by two. It should never be less than half the height of the individual.

RESPIRATORY MOVEMENTS.—The respiratory movements should be very carefully studied, both as to frequency and character, and especial attention should be directed to any irregularity of movement. The slight lagging of the affected side escapes the attention of the physician with remarkable frequency. At times, in the female, the superior costal respiratory movement is so modified very early, as to resemble the abdominal type of the male.

RESPIRATORY EXPANSION.—Diminution of the respiratory expansion is noted early in the disease and this diminution is usually progressive. Lagging may be noted early in the case, but becomes more noticeable as the case progresses.

Want of symmetry of form is not one of the earliest signs, but as the case progresses there may be a very noticeable disparity between the two sides in the infraclavicular region, partly from impeded movement on the one side and from compensatory activity on the other. The "vital index" (the relation of the chest circumference to the height), as well as the relative expansion, is low in the tuberculosis patient. Liability to the disease is thus revealed by physical peculiarities.

It must be remembered that, in the foregoing, we are considering the usual case without regard to the irregular forms and anomalous distribution of signs.

EXAMINATION OF THE CHEST.

Preliminary to the physical examination, it seems advisable to call attention to the following facts, which, while well known to the physician, are well worth repetition and emphasis at this time:

First.—On account of the size and direction of the right bronchus, there is a normal disparity between the two sides of the chest. In the right infraclavicular space, and above the right scapula behind, the percussion note is slightly higher in pitch than on the left side. On auscultation, the respiratory murmur is more intense, slightly harsher in quality and higher in pitch. On auscultation of the voice in the above region the intensity is relatively greater on the right side than on the left, and the breathing is often vesiculo-bronchial. This normal disparity is of the

utmost importance in arriving at a conclusion. If the two sides are alike, or if there is even the slightest difference in favor of the left side, a pathological condition is probably present in the left side. The degree of disparity varies in different individuals.

Second.—The initial, pulmonary lesion is usually found just below the summit of the right apex, in that part of the lung area supplied by the bronchial branch, known as the *ramus apicalis posterior*. Neither this part of the lung nor the bronchus supplying it are as well developed as the other parts of the lung, and the respiratory movements are feebler. (Birch-Hirschfield, *Deutsche Archiv fuer klin. Medicin*, 1899). Boviard, (*N. Y. Medical Journal*, July 1, 1899), claims that the primary lesion, in children at least, is to be found in the bronchial lymph nodes. It may be found in some other region, however.

The initial lesion of the lung consists at first of one or more small nodules. There is a lobular consolidation in which area there is a localized bronchitis. There is a small, circumscribed area of broncho-pneumonic lung, surrounded on all sides by normal lung. In some cases, according to Birch-Hirschfield, (*Deutsche Archiv fuer klin. Medicin*, 1899), the process begins as a subepithelial tuberculous infiltration of the mucous membrane of tubes of medium calibre. The peribronchial tissue is secondarily involved, the lumen of the bronchus becomes narrowed and the corresponding part of the lung may collapse.

In the former case, the moment one of the nodules becomes softened and broken down, then excavation, in a pathological sense, has begun, and tubercle bacilli may be found in the sputum at this time. There are no clinical symptoms which infallably indicate softening and there are no physical signs of this slight excavation, but the elastic fibres and the tubercle bacilli in the sputum demonstrate that excavation, in the pathological sense, is present.

The effect of these bronchopneumonic areas is first to cause relaxation of the surrounding lung and, second, to give rise to the characteristic, physical signs to be described presently.

In the second case, we should find the physical signs of a sharply localized bronchitis with its subcrepitant rales.

PALPATION.—Palpation serves to confirm the findings of inspection and, perhaps, to extend them. Any lagging will be detected; want of respiratory expansion will be noted and estimated and fremitus, if anywhere increased, will be detected and its location noted.

PERCUSSION.—To the novice in the art of percussion, as well as to the man of wider experience who is not perfectly familiar with the physical changes induced by relaxation of the lung and the physical signs which are their exponents, this method of examination is often unsatisfactory and misleading. Many physicians describe dullness on percus-

sion, with necessary consequent rise in pitch, as the earliest percussion evidence of localized, early tuberculosis of the apex, but this is not the case.

The first effect of these broncho-pneumonic areas is, of course, to lessen the air in these small areas, and this would, theoretically, tend to raise the pitch and diminish the resonance. But it will be borne in mind that these areas are small and deeply situated and that their principal effect is to cause relaxation of the surrounding normal lung tissue. The percussion note of the surrounding tissue, consequently, becomes hyperresonant or even tympanitic in quality—"Skodiatic resonance." Hence, it may be stated, that the percussion note of these cases, seen early, is "Skodiatic" or semi-tympanitic in quality rather than dull. Later in the disease, when consolidation has increased in degree and extent, the quality changes, the resonance diminishes and the pitch rises until dullness or even flatness indicates that consolidation is complete. The physician who waits for dullness or percussion before diagnosing tuberculosis, has waited for the whole clinical house to fall upon him.

We now proceed, by comparing symmetrical points on the two sides, until both lungs have been carefully examined.

AUSCULTATION.—Auscultation, together with the auscultation of the voice, furnishes us with the most important and reliable of all the evidence on which a diagnosis is based. Of no less importance than auscultation itself however, is the method of performing it.

We should first listen to the respiratory sounds as the patient breathes normally, noting the relative length of the inspiratory and expiratory movements and of the inspiratory and expiratory sounds, remembering that in the former the relationship is as six to seven, and in the latter as ten to two.

Next to be noted is the relative intensity of the inspiratory and expiratory murmur, remembering that the pitch of the latter is lower than that of the former, and also bearing in mind the normal disparity of the two sides, already described.

Next should come examination with deep inspiration of the patient. This is very important, as the intensity of the respiratory sounds depends upon the activity of the respiratory act.

THE EARLIEST RESPIRATORY SIGN OF BEGINNING TUBERCULOSIS IS ENFEEBLED BREATH SOUNDS, OR A SLIGHTLY ROUGHENED, HARSH, RESPIRATORY MURMUR, AUDIBLE DURING EXPIRATION, OR THE EXPIRATORY SOUND SLIGHTLY PROLONGED. This slight increase of the expiratory murmur may be the only sign at first and may not possess the slightest suspicion of tubular quality, but merely a slight increase in intensity.

As the case progresses the quality becomes harsher and ultimately, coincident with consolidation, it acquires a bronchovesicular, and later,

a bronchial or tubular quality. As the pathologic condition is a localized broncho-pneumonia, the accessory signs of this condition will be present. These consist principally of subcrepitant rales, due to the bronchitis, and crackling rales, the latter, like the crepitant rales of pneumonia, being audible only during inspiration, and usually only at the end of the inspiratory act.

The crackling rales differ only from the crepitant rales of pneumonia, in the number of "crackles" coming to the ear in a unit of time, or during a single inspiration. At times they assume a squeaking quality, and at others, seem larger in size. The rhythm is characteristic. Both of these signs may precede the appearance of the tubercle bacilli in the sputum.

The meaning of a slight, localized bronchitis which is persistent, should never be misinterpreted. It nearly always means a beginning of tuberculosis, whether the initial lesion consists of multiple nodules or of subepithelial infiltration of the mucous membrane.

Auscultation of the cough is another means of securing evidence of the increased intensity of the respiratory sound by means of violent respiratory movements.

Auscultation of the Voice is of great value in confirming the findings of percussion and auscultation. In any area where there is the slightest rise in pitch due to consolidation, and where rales are even slight, these findings will be amply confirmed by the increased intensity of the vocal resonance. This differs in no respect from the normal resonance except in intensity. As consolidation increases, the intensity becomes augmented and, ultimately, the increased resonance is replaced by bronchophony, characterized by high pitch, concentration and nearness to the ear, with intensity, in some cases, not above normal. The normal vocal resonance, on the other hand, is low in pitch, diffuse and distant. Auscultation of the voice is of far greater value than is generally recognized by the general practitioner and should always be used as a routine method in every examination of the chest. It readily reveals degrees of consolidation which cannot be detected on percussion even by the most expert. It is both delicate and trustworthy.

In this description of signs, it has been assumed that the lesion is confined to the apex, which is usually the case. Anomalous distribution of signs may occur, however, and these same signs may be found at the base instead of the Apex. At times it happens that the lesion is at the base or at the apex of one of the lower lobes, or along the interlobar incisure under the margin of the scapula. This merely gives emphasis to the advice to examine the whole of both lungs in all cases. It sometimes happens that, though the dominant signs may be in some region other than the apex, an old lesion in the latter may be found if a careful search is made for it.

THE SPUTUM.—The sputum should next be examined. A morning

specimen should be selected. This should be spread on a block of black glass and the small opaque specks and curdy masses should be selected. These should be smeared on the cover glass, stained, counterstained and mounted in the usual manner, and then carefully examined.

If the result of the first examination be negative, other sides should be prepared and the sputum should be examined for several successive days. In any case where the tubercle bacilli are found in the sputum, there can be no excuse for failure to make a correct diagnosis, but here, as in the physical examination, more mistakes are made from want of examination than from want of knowledge.

In any case in which symptoms and signs indicate a probable diagnosis which is not confirmed by the examination of the sputum, we should resort to the inoculation of guinea pigs. From 0.5 to 1.5 c.c., of sputum should be injected into the peritoneal cavity of the guinea pig and the animal should be killed in four weeks and examined. E. Levy and H. Burns, (*Deutsche Med. Woch.*, March 1900), recommend that the sputum be heated to 60 degrees centigrade for ten minutes, in order to destroy other microorganisms. Such a procedure might easily lead to error since Dr. Theobald Smith has shown, (*Journal of Experimental Medicine*, 1899, p. 217), that the thermal death point for tubercle bacilli is fifteen to twenty minutes at 60 degrees centigrade.

Having completed the clinical and the microscopical examination, and even the inoculation of animals, we have not yet exhausted our resources. While it is true that in almost all cases of pulmonary tuberculosis a correct diagnosis will have been reached, if the examination outlined has been followed by a physician capable of classifying and interpreting his findings, there are some cases where uncertainty may still exist.

THE SERUM TEST.—Where further evidence is essential in the establishment of the diagnosis, recourse may be had to the serum test. Mongour and Buard, (*Journal of the American Medical Association*, Jan. 21, 1899), obtained positive serum reaction in four cases of tuberculous pleurisy and in nine cases of pulmonary tuberculosis, and detected latent tuberculosis in twenty other cases. However, the value of the serum test is not as yet fully determined.

THE X-RAY.—The X-Ray has its advocates as a valuable means of early diagnosis, but the cost of the necessary apparatus, together with the high degree of technical skill required to properly utilize it, will serve to limit its value which has not yet been satisfactorily demonstrated.

THE IODIDE OF POTASSIUM TEST.—The iodide of potash test is of very considerable value. In those cases in which there are very faint physical signs and an absence of even the amount of sputum necessary for microscopical examination, or where it is desired that the extent of

the tuberculous process be determined and located, this method offers many advantages.

Before the Chicago Society of Internal Medicine, December 22, 1898, Dr. Edward F. Wells read a valuable paper on the value of iodide of potassium in locating the lesion in pulmonary tuberculosis, as first suggested by Stricker. Its value is due to the fact that, when an iodide is administered, it is partly eliminated by the bronchial mucous membrane, increasing the bronchial mucus chiefly by the addition of water, thus causing the development of rales or the accentuation of those scarcely audible before. (*Journal of the American Medical Association, February 4, 1899.*)

Dr. Wells says, "Generally speaking, it may be affirmed that in these cases in which tuberculosis is proven to exist, but with inability to locate the lesion, the locality and extent of the affected area may be made evident by the development of rales; that in cases with rales and an apparent inability to demonstrate the extent of the local involvement, the observer will be gratified with the clearness of the auscultatory evidence and astonished at the revealed extent of the deposit, and that in cases of suspected tuberculosis, rales and bacillary expectorate may be obtained earlier than is possible by any other means." In conclusion, he says, "I believe that the iodide of potassium test, as described, is free from danger and serious objections; that it lends itself readily to the exigencies of routine practice; that in the early pulmonary tuberculosis and in defining the location and extent of the lesion, it is a useful addition to our diagnostic resources." The iodide of potassium should be given in doses of three grains, three times a day, for two or three days.

The method, while open to some theoretical objections, has proven practically satisfactory and helpful.

Dr. Murat (*N. Y. Medical Journal, May, 1899*), directs attention to what he regards a new and valuable sign of tuberculosis, consisting of a subjective sense of vibration in the affected apex on loud speaking. This sign may be used in confirmation of the diagnosis, in cases far enough advanced for considerable consolidation, but at this stage of the disease it is not needed and adds little to the evidence otherwise secured.

PUBLISHED BY ORDER OF THE STATE BOARD OF HEALTH.

GEO. W. WEBSTER, M. D., President.

JAMES A. EGAN, M. D., Secretary.

Springfield, February 1, 1905.

BACTERIOLOGICAL EXAMINATION OF SPUTUM.

The State Board of Health has established a laboratory at Springfield for bacteriological research, and will make examinations of sputa in cases suspected of being tuberculosis, free of all charge.

Specimens should be sent to the laboratory in specially devised containers provided by the State Board of Health, which are made in accordance with the rules of the Post Office Department. It is the intention of the Board to maintain one container station in each county, which will probably be in charge of the Secretary of the County Medical Society. Where such a station is not available, physicians should communicate with the Secretary of the Board at Springfield.

To insure immediate attention to correspondence relative to the examination of sputa, letters should be addressed:

SECRETARY OF THE STATE BOARD OF HEALTH.
SPRINGFIELD, ILLINOIS.

EXAMINATION OF SPUTA.

Physicians and health officers are requested to communicate with the Secretary of the Board from time to time, advising him of unusual prevalence of tuberculosis in any locality and of such means as may suggest themselves as practicable in stamping out or preventing the spread of this disease.

Information concerning cases under observation where tuberculosis appears to have been communicated, directly or indirectly, from one person to another, the relation between the individuals, the presence of family predisposition, if any and other interesting facts in connection with such cases will be greatly appreciated.

Whenever it appears necessary, the State Board of Health will send inspectors to infected localities.

Copies of the circular issued by the State Board of Health on the Cause and Prevention of Consumption for distribution among the laity can be obtained in any desired quantity without cost by addressing the Secretary at Springfield. The Board urges that Physicians and Health Officers place one of these circulars in every household in which there may be a consumptive patient.

THE ILLINOIS CIRCULAR ON CONSUMPTION.

(New York Medical Journal and Philadelphia Medical Journal.)

Among the Sanitary organizations that really do something toward providing the people with information we must accord a high place to the Illinois State Board of Health, a body to which both the medical profession and the population at large are deeply indebted. The Board's circular on The Cause and Prevention of Consumption, first issued in July, appears now in the form of a third edition. We learn that the demand for copies of this circular, not only in Illinois, but also in almost every State of the Union has been remarkable. This is not to be wondered at when we reflect upon its simple and cheering words to consumptives.

One of the Board's chief purposes in the preparation of the circular has been that of disabusing the public mind of the conviction that any particular climate is indispensable to the consumptive's recovery. Professional opinion has largely escaped from the notion that the climatic element is all-important in the treatment of pulmonary tuberculosis disease, and the circular cogently impresses this fact upon the popular comprehension by pointing out the encouraging results obtained in the sanatoria of the States of New York, Pennsylvania and Massachusetts and by declaring that those institutions are under no more favorable climatic conditions than are easily attainable in Illinois or in almost any other State. We may all readily endorse this teaching without in the least abandoning the idea that certain climates are to be preferred for consumptives for the reason that they render the modern treatment easier to carry out.

The circular not only tells the victim of pulmonary tuberculosis infection how he should conduct himself in order to recover his own health; in addition, it instructs him convincingly in the measures that he is in duty bound to take to guard against spreading his disease among others. The epigrammatic "No spit, no consumption," that runs through the pages, can hardly fail to prove properly impressive. It is reenforced by pictorial reproductions of certain "signs of the times" in the form of placards prohibitory of spitting in public—all, we must admit, more forcible than our halting New York declaration that spitting on the floor of a car is "unlawful." At the same time, the consumptive's inability to avoid spitting, save by the dangerous alternative of swallowing his sputum, is fully recognized, and he is informed as to the proper management of expectoration. On these and on all other practical points the circular is explicit and impressive, and this is chiefly due to the plain language employed. It is in every way to be commended.



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